

**Open Letter to Dr. Mark Lehner
from Bill McNulty**

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**Fig. 1 Casting Hieroglyphic from
Funerary Papyrus of the Steward of Sethnakhte**

In the 1991 NOVA special *This Old Pyramid* Professor Joseph Davidovits explained his pyramid construction theory. In 1991 Professor Davidovits believed a material similar to concrete was carried in a wet form to the site of the Giza Pyramids and cast in wooden forms. Professor Davidovits was questioned by Dr. Mark Lehner on his theory of Egyptian pyramid construction and their dialog can be seen in the above TV episode. I would like to offer some different answers to Dr. Lehner's questions about the construction of Ancient Egyptian Pyramids.

Joseph Davidovits and Margaret Morris coauthored "*Pyramids: An Enigma Solved*" which details their pyramid construction theory. Joseph Davidovits has released an updated book on his theory called "*They Have Built the Pyramids*" and Margaret Morris authored a book "*The Egyptian Pyramid Mystery is Solved*". For a more detailed description of Davidovits theory of pyramid construction visit www.geopolymer.org.

Before I address Dr. Lehner's questions I would like to state that Joseph Davidovits and Margaret Morris were an inspiration to start my own investigation into construction of the

Giza Pyramids. I've developed my own theory of why and how the Giza Pyramids were built which can be found at www.gizathrone.com.

Now to Dr. Lehner's questions –

Question 1. “What was the advantage of this ... of reconstituting the limestone... What was the advantage as opposed to cutting the blocks?”

Current archeological belief states that blocks of stone weighing up to 70 tons were dragged up temporary external ramps or internal ramps to build the Giza Pyramids. This possible internal ramp has been detailed by Bob Brier and Jean Pierre Houdin in their book “*The Secret of the Great Pyramid*”. Mark Lehner has detailed his view of pyramid construction in his book “*Who Built the Pyramids?*”.

A more likely possibility is that the blocks of stone used in pyramid construction were cast by Ancient Egyptian pyramid builders who carried buckets of natron (sodium carbonate) and limestone (calcium carbonate) or granite to wooden or woven casting forms to cast the Giza Pyramid blocks in situ. Once the forms were filled with the cementitious material of natron and limestone or granite jugs of water were added to start an exothermic reaction that turned the stone mixture into a solid stone. This cementitious material is similar to today's concrete and the Ancient Egyptians were the first to cast pyramids, Egyptian statues and obelisks.



Fig. 2 Workers casting pyramid blocks from the Tomb of Rekhmire

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In the Tomb of Rekhmire a mural depicts pyramid block casting. The upper section of the Rekhmire mural above shows a brick maker making mud bricks from a pile of mud, as they are still made today. The water carriers and the workers of the lower section of the mural are carrying material from piles of natron and limestone or granite to pre-

positioned forms where they cast pyramid blocks from the combination of natron and stone. The size of the two piles of natron and limestone or granite are a pictorial representation of the percentage of the natron to stone mixture. The Giza Pyramid builders cast the pyramid blocks with a mixture of 20-30% natron to 70-80% limestone or granite dust and chips.

After the wooden or woven casting forms were filled with the cementitious mixture large jars of water were added until the cementitious material had the consistency of a slurry. After the cementitious material completed the hardening process the casting forms would be removed, repositioned, refilled and the procedure would be repeated over and over as the Giza Pyramids rose course by course. The hardened cast stone would appear to be a carved block of limestone or granite.

After the cementitious material hardened a layer of salt would rise to the top of the cast pyramid stones. This salt residue was removed with boning rods and string before the next course of pyramid blocks were cast. For a description of pyramid casting please read the casting article at www.gizathrone.com.

Question 2. “You know there is mortar between the blocks in the pyramids?”

The simple answer to this question is - toes. Or more specifically, pyramid builder's toes. To prevent the Ancient Egyptian pyramid builders from breaking toes and other bodily injuries it was necessary to fill the gaps between the stone blocks. Filling the gaps between the pyramid blocks also helped fix the natron component of the cementitious mixture. Mortar was the best material to fill the gaps between the Giza Pyramids blocks because it would easily flow into the gaps.



Fig. 3 Tomb of Rekhmire mural showing workers casting pyramid casing stones

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The interior chambers of the Giza Pyramids were not sealed and a layer of salt was present when the chambers were opened in 820 A.D. Salt encrustation in the Great Pyramid interior chambers is still a continuing problem. The leached salt on the interior chamber walls of the Giza Pyramids has been removed numerous times in the past forty years. To stop this salt leaching from the walls on the interior chambers of the Giza Pyramids a layer of sealing wax needs to be applied or the material needs to finish the curing process after more than 4000 years.

Question 3. “There are spaces between all the blocks in the pyramids. Why?”

Wooden and linen forms were used to cast the pyramid blocks of the Giza Pyramids. After the cementitious material of natron and stone went through an exothermic reaction and solidified into a solid block of stone the wooden form between the blocks were removed and an empty space remained where the form separated each stone block from the next one. The spaces between the cast pyramid blocks was filled with mortar during construction and in some places this mortar has disintegrated over the millennia.



**Fig. 4 A casing block on the Osiris Pyramid
with an empty casting brace hole**

A slightly different method was used to cast the casing stones of the Giza Pyramids. The casing stones of the Giza Pyramids were cast without a gap between the blocks. After a casing stone was cast the wooden or woven forms were repositioned to form the far side and front of the next block. Each casing block was used to form one side of the next casing stone on the same level. When the casing casting forms were removed a

hole was left at the bottom of the cast casing stone from a bracing plug that was used to hold in place one side of the casting form during casting.

In the casing stones of the Menkaure or Re Pyramid a combination of forms was used to cast the casing stones. Some Menkaure or Re Pyramid casing stones are smooth and flat and others have a protruding “unfinished” look. These protruding casing stones were probably cast using a combination of wood and woven linen casting forms. A wooden form was used along the interior of the blocks and a cloth container was attached to the wood that allowed the cementitious material in the forms to extend beyond the exterior or exposed wooden casting forms. This wood/linen casting form combination gave each casing block a unique “unfinished” shape. A similar method of casting stone was used in the blocks of Machu Picchu and Cuzco in Peru.



Fig. 5 Casing stones of the Menkaure or Re Pyramid
(Note the smooth sides of the blocks in the upper left corner)

Question 4. “But, in the Queens Pyramids where the pyramid is almost half destroyed, of Menkaure, for example, or the queens pyramids of Khufu, there are big, big spaces between all the blocks and they are very irregular, almost like boulders. So why are there these spaces if one block is poured against another block? Like concrete?”

The cementitious mixture of natron and stone wasn’t poured. Natron and limestone or granite was carried in buckets and poured in a dry state into wooden or woven forms on all courses of the Giza Pyramids. Water was added to the casting forms after they were

filled with the natron and stone mixture in sufficient quantities to cause an exothermic reaction. The exothermic reaction of the natron/stone mixture converted the cementitious material into solid blocks of stone. This cementitious mixture is similar to today's concrete.

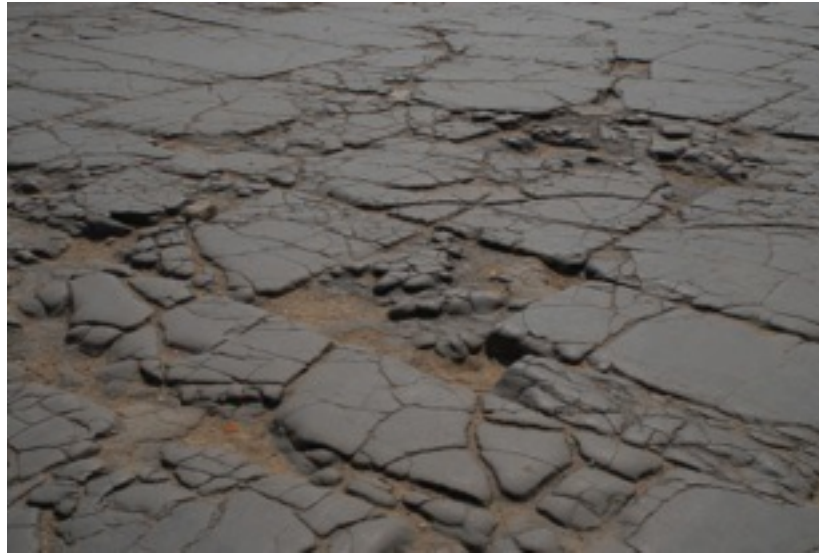


Fig. 6 Basalt platform near the NE corner of the Great Pyramid with cracks due to bad casting



Fig. 7 Cast basalt platform on top of limestone base

If the cementitious material wasn't mixed properly or water didn't reach all of the material during the casting process the exothermic reaction wouldn't have occurred and produce a stable stone product. Giza pyramid workers who used a bad mixture of natron to stone or the wrong ratio of water it would have created an unstable finished product. Pyramid stone blocks cast with a bad mixture would eventually disintegrate when exposed to the elements and be washed away or

worn down by wind, rain and sand over the millennia. The breakdown of improperly mixed or unsealed cast pyramid stones has caused the irregular shaped blocks found on the Giza Plateau which Dr Lehner is questioning.



Fig. 8 **Stack of cement sling bags each weighing about 3 tons**

Question 5. “Why are there tool marks on these blocks?”

The tool marks on the Giza pyramid blocks come from copper chisels used to carve the wooden casting forms. After the natron/stone cementitious mixture solidified into a solid block of stone an impression would remain from any tool marks on the inside of the wooden casting forms. If you check the pyramid stones you can probably see multiple blocks that have exactly the same “tool marks” on their surface.

You can see impressions left in today’s poured concrete where plywood was used to form up concrete structures. Marks left by plywood knots and wood grain from the plywood used in today’s poured concrete can be seen after the casting forms are removed when the wet cement has hardened.

I hope these answers to Dr. Mark Lehner’s Pyramid construction questions will help continue the debate about how the Giza Pyramids were built. Taking core samples from a number of the millions of limestone and granite blocks that make up the Giza Pyramids will confirm whether the stones were cut from Giza and Aswan quarries or cast in situ using a natron and stone mixture.



Fig. 9 Plywood knot and wood grain imprints left on today's poured concrete

About the Author- I currently hold two United States patents which combine sodium carbonate(natron) with calcium carbonate, limestone, granite, schist, sandstone, basalt and other stone materials with water to re-constitute the cementitious material into solid stone objects or products. Please check out U.S. Patents - #6,264,740 and #6,913,645 at the web site - www.uspto.gov.